Identifying Internet Usage Patterns in UUM

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ABSTRACT

UUM endless fight to accommodate users demand for internet bandwidth had been raging for years without ending. Bandwidth shaping tool had been implemented to enforce policies of internet usage but still user demand are endless. Preliminary study for user characteristic and pattern in internet usage would offer UUM a better insight of it users characteristics and current trends and even predicted future usage. This research was done to identify patterns and trends regarding internet usage in UUM environments. The data was obtained from NetEnforcer, a bandwidth management devices currently used in UUM. The data instances that were included are total bandwidth usage, ip addresses and protocols. The data that was recorded in twenty four hours a day for duration on nineteen weeks has been analyzed and finally a few suggestions were presented in order to improve UUM's internet bandwidth management policies.

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LIST OF ABBREVIATIONS

DHCP	Dynamic Host Configuration Protocol
DMZ	DeMilitarized Zone
HTTP	Hypertext Transfer Protocol
ICMP	Internet Control Message Protocol
LAN	Local Area Network
MRTG	Multi Router Traffic Grapher
TCP/IP	Transmission Control Protocol/ Internet Protocol
P2P	Peer to peer
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UUM	Universiti Utara Malaysia
VPN	Virtual Private Network
WAN	Wide Area Network

Chapter One

This chapter elaborates and explains the main part of the study, which include the background, problems statement, objectives, scope and significant of the study. Justification of the studies also will be revealed and discuss in this chapter.

1.1 Introduction

The internet refers to the entire connection of interconnected networks around the world that share a common addressing scheme (Fomenkov, Keys, Moore & Claffy, 2003). Therefore Internet traffic is the result of interaction between millions of users, heterogeneous application and sophisticated protocols even if our concern is on a specific closed environment. Human factors are unpredictable and diversified, resulting in difficulties to manage or monitor internet traffic.

1.2 Background

UUM Computer Center had been struggling to provide its demanding users with sufficient internet bandwidth for learning and teaching since the early years till now. Upgrading of its internet bandwidth had been conducted several times from 2Mbps line to 4Mpbs, 4Mbps to 45 Mbps and finally to the current 155 Mbps. Even the latest upgrade had started to show early symptom of congestion. Different technologies and providers like satellite link also had been explored to provide better services but still the demand is high as the numbers of users is

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REFERENCES

Abbas, A., Osman, B., & Din, R. (2007). Network Respond Time : Case Study UUM ISLAN, Universiti Utara Malaysia.

Balachandran, A., Voelker, G.M., Bahl, P., & Rangan, P.V. (2002).Characterizing user behavior and network performance in a public wireless LAN, Joint International Conference on Measurement and Modeling of Computer System, Proceedings of the 2002 ACM SIGMETRICS international conference on Measurement and modeling of computer systems, SESSION: Networks II, Pg 195 - 205 . doi:10.1145/511334.511359

Chiu, D-M., & Sudama, R. (1998). Studying the use and application behavior of a large network, Workshop on the Future Trends of Distributed Computing Systems in the 1990's, 1998 Proceedings, Pg 14-22. doi : 10.1109/FTDCS.1988.26674

Claffy, K., Miller, G., & Thompson, K. (1998). The Nature of the Beast: Recent Traffic Measurements from an Internet Backbone, Proceedings of INET '98.

Estan C., Savage, S.R., & Varghese, G. (2003). Automatically inferring patterns of resource consumption in network traffic, Proceedings of the 2003 conference on Applications, technologies, architectures, and protocols for computer communications, Karlsruhe, Germany, Pg 137-148. doi:10.1145/863955.863972

Feldmann, A., Greenberg, A., Lund, C., Reingold, N., & Rexford, J. (2001). Deriving Traffic Demand s for Operational IP Networks : Methodology and Experience, IEEE/ACM Transactions on Networking, Volume 9, Issue 3, Pg 265-280. doi : 10.1109/90.929850

Fomenkov, M., Keys, K., Moore, D., & Claffy, K. (2004). Longitudinal study of Internet traffic in 1998-2003, ACM International Conference Proceeding Series, Volume 58, Pg 1-6.

Fowler, H.J., & Leland , W.E. (1991). Local area network characteristics, with implications for broadband network congestion management, IEEE Journal on Selected Areas In Communications, Volume 9, Issue 7, Pg 1139-1149. doi: 10.1109/49.103559

Fred, S.B., Bonald, T., Proutiere, A., Regnie, G. & Roberts, J.W., (2001). Statistical bandwidth sharing : a study of congestion at flow level, ACM SIGCOMM Computer Communication Review, Volume 31, Issue 4, Pg 111-122. doi:10.1145/964723.383068

Kim, Won, Y.J., & Hong, J.W. (2005). Characteristic analysis of internet traffic from the perspective of flows, Computer Communications Volume 29, Issue 10, pg 1639-1652. doi:10.1016/j.comcom.2005.07.015

McCreary, S., & Claffy, K. (2000). Trends in wide area IP traffic pattern : a view from Ames Internet eXchange, 13th ITC specialist seminar : IP Traffic measurement, modeling and management.

Tang, D., & Baker, M. (2000). Analysis of a Local-Area Wireless Network, International Conference on Mobile Computing and Networking, Proceedings of the 6th annual international conference on Mobile computing and networking, Pg 1-10. doi: 10.1145/345910.345912

Thompson, K., Miller, G.J., & Wilder, R. (1997). Wide-area Internet traffic patterns and characteristics, IEEE Network, Volume 11, Issue 6, Pg 10-23. doi: 10.1109/65.642356

Odlyzko, A.M (2003). Internet traffic growth: Sources and implications, in *Optical Transmission Systems and Equipment for WDM Networking II*, Volume 5247, Pg 1-15.

Pise, K., Dethe, C.G., & Wakde D.G. (2003). Characterising WAN usage patterns in a local area network, SSGMCE – Telecommunications, ConTEL 2003, Proceedings of the 7th International Conference, Volume 2, Pg 649-652. doi: 10.1109/CONTEL.2003.1215885

Roberts, J.W. (2001). Traffic Theory and the Internet, IEEE Communications Magazine, Volume 39, Issue 1, Pg 94-99. doi: 10.1109/35.894382